Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

Reserve
A73.4
R312

UNITED STATES
DEPARTMENT OF AGRICULTURE
LIBRARY

Reserve
BOOK NUMBER A73.4
R312
931863

UNITED STATES DEPARTMENT OF AGRICULTURE
2 U.S. Agricultural Research Service
2a Field Crops Research Branch
5a Beltsville, Maryland,

3
Ramie

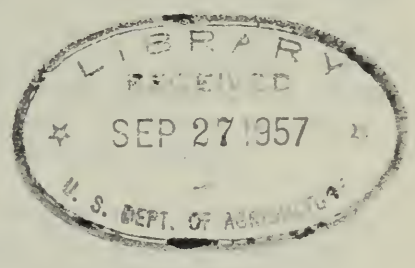
Ramie, Boehmeria nivea, is a stingless nettle plant whose slender stems yield a textile fiber that is strong and silken. The ramie product best known in the United States is "grass linen," made in the Orient. Recently many other products made partly or wholly from ramie have been appearing on the market as wool or mohair substitutes. Other items such as marine packing, milk filters, and dress materials are also being made from ramie fiber.

In the Orient, ramie was a principal plant fiber before the introduction of cotton in 1300. It is still used in relatively large quantities in China, where ramie manufacture is primarily a cottage or handicraft industry. Some ramie is manufactured in Japan and in certain European countries, where it competes with flax.

Ramie was introduced into the United States about 1855. Since then many attempts have been made to grow and manufacture it here, but these attempts have usually failed, creating a bad reputation for ramie among textile investment interests. Nevertheless, because of its many superior textile-fiber characteristics, ramie has continued to interest scientists, inventors, and promoters and manufacturers seeking new fields. However, only a little more than 3,000 acres were harvested in the United States in 1954, nearly a century after the introduction of the crop.

Approximate Production of Raw Ramie Fiber in the United States, 1946-1954

Year	Raw Ramie Fiber (1,000 lbs.)
1946	220
1947	800
1948	800
1949	800
1950	1,200
1951	1,500
1952	3,000
1953	2,000
1954	1,200



Ramie yields have varied widely in the United States. On adapted soils, annual yields of 800 to 1,200 pounds of dry fiber have been obtained from three to four cuttings in one year on a plantation basis. These yields may be exceeded under optimum conditions, and on soil that is not so suitable, much lower yields are obtained.

In the United States, ramie has grown best on the organic soils of the Florida Everglades and on the fertile alluvial well-drained river bottoms of the Gulf States. Ramie has also grown well on the fertile medium-heavy irrigated soils of the Southwest. Sandy soils are usually unsuitable for ramie because of their low moisture-holding capacity and low fertility. The heavy vegetative growth that is desirable in ramie removes a fair amount of nutrients from the soil, and fertility must be maintained by the addition of fertilizer or poor yields will soon be evident.

931363

Ramie is propagated from rootstocks. When the planting is done by hand, pieces of roots about 6 inches long with eyes (buds) are planted in a slanting or upright position with the upper end just below the surface. The rows are 3 to 4 feet apart to facilitate cultivation the first year. When the planting is done by machine, the position of the roots is not controlled--they are dropped at random, about 10 inches apart in the rows. The crop is seldom propagated from seed since it is difficult to obtain stands and the plants that grow are not true to type. The seeds are very small, averaging several million to a pound.

Ramie requires some cultivation the first year to control weeds, although the plants quickly fill in the space between the rows and between the plants in the rows, forming an almost solid bed. When poor stands of ramie are obtained, cultivation may be necessary the second year, but benefits from additional cultivation have not been fully demonstrated.

The roots of ramie send up a new growth of stems each spring. In the extreme southern states the plants reach full growth, 4 to 7 feet, in 45 to 60 days, but farther north a longer period of time is required. It is possible to harvest three to four crops each year in southern Florida, while no more than two are obtained at the northern limit of its production. Winterkilling of roots occurs to some extent around Washington, D. C., and it does not seem practical to grow the plant that far north, where extensive mulching to protect the roots would be necessary.

After the stems reach their maximum height, flower buds form in the axils of the upper leaves. At this time the lower part of the stems of some varieties turn brown and new shoots may begin to appear above the soil. These growth characteristics have been associated with the most practical time to begin harvesting. In the Orient the plants are harvested by hand, but in the United States they are harvested mechanically; a hemp binder is being used with satisfactory results.

The fiber is separated from the green succulent stems. They are neither dried nor retted as are the stems of other well-known fibers such as flax and hemp. The plants must be processed quickly in order to prevent the molding and deterioration that is likely to occur in the warm humid regions to which ramie is adapted. In the Orient, ramie fiber is scraped from the stems by hand with crude implements. Mechanical cleaning, or separation, has been introduced in the United States and has aided materially in the successful ramie fiber production in this country.

Many different machines have been developed for mechanizing ramie processing. Generally most of them involve what is known as the raspidor principle, used for many years on hard fiber. Here the main action results from a rapidly revolving cylinder with blades that scrape the stems and separate the wood from the bark or ribbons as they pass between the periphery of the cylinder and a base plate that holds the fiber against the blades. There are both portable machines and permanent installations for separating the fiber from the stems. Each has advantages and disadvantages.

The portable machine leaves the waste material in the field where it aids in maintaining fertility. The amount of handling and transporting of the unfinished material is kept at a minimum. So far, however, no portable machine has been put into use for large-scale commercial production in the United States.

Portable machines that will harvest (cut) and deliver partially cleaned fiber are under development by Government and private interests. However, all portable machines so far developed must be considered to be still experimental.

Despite the many potential advantages of a portable machine, mechanized production developments in the United States have tended to favor permanent installations to separate the fiber from the green stems. One advantage is that water can be sprayed on the fiber to aid in removing the bark and gums surrounding the fiber. Probably the most important reason for centralized processing machinery is that permanent-type machines designed for hard fibers have been adapted successfully for ramie. But such installations require large financial investment. Moreover, the bulky raw material must be hauled at considerable cost to the centrally located machinery and the waste removed. The area of production is limited to locations near the centralized machinery.

The crude fiber thus produced, either mechanically or by hand methods, is called "China grass" or raw ramie fiber. Before spinning, it must be further cleaned by the removal of gums and encrustants with chemicals. This is done by the spinners in European mills but due to lack of such facilities in the United States separate degumming plants are being established.

The fiber has a breaking strength surpassing most other textile fibers. This characteristic, together with a beautiful luster that resembles silk, has encouraged many individuals to initiate research or promotion to exploit the fiber.

Despite the tremendous amount of publicity that has been given to ramie, there are no spinning mills in the United States that have made a continuous business of spinning the fiber.

Our imports from 1922 to 1933 averaged less than 1 ton per year; those during the past 21 years are shown in table 1.

Table 1. United States imports of raw ramie fiber (China grass) for consumption, 1934-54. (In tons of 2,240 pounds)

Year	Tons	Year	Tons	Year	Tons
1934....	9	1941.....	373	1948....	120
1935....	2	1942.....	67	1949....	62
1936....	47	1943.....	4	1950....	(1/)
1937....	25	1944.....	17	1951....	21
1938....	102	1945.....	35	1952....	49
1939....	(1/)	1946.....	98	1953....	22
1940....	163	1947.....	128	1954....	0

1/ Less than 1 ton

Source: U. S. Bureau of Foreign and Domestic Commerce and Bureau of the Census.

Most of the domestic output of raw ramie was exported until 1951, when facilities were established for degumming. Since then much more of the fiber has been used domestically.

E. G. Nelson
9-30-55